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HAND GRIP STRENGTH AS A PREDICTOR OF DETRUSOR UNDERACTIVITY IN MALE PATIENTS WITH LOWER URINARY TRACT SYMPTOMS

Hypothesis / aims of study
Hand grip test has been shown to predict adverse outcome such as mortality, functional decline, and hospitalization. Although several studies showed an association between hand grip strength (HGS) and global muscle strength, no studies have investigated the correlation between HGS and bladder function. We prospectively assessed the relationship of bladder contractility and hand grip strength.

Study design, materials and methods
The study included men who underwent urodynamic pressure flow study for the evaluation of lower urinary tract symptoms (LUTS). Exclusion criteria were spinal lesion including spinal cord injury and myelitis. All men were asked to perform hand grip test before urodynamic study (UDS). Hand grip strength was measured using a maximal isometric tester for the dominant upper limb. Bladder contractility was assessed by Bladder contractility index (BCI: $P_{det}Q_{max} + 5Q_{max}$). Detrusor underactivity was defined as BCI less than 100. HGS was compared between detrusor underactivity (DU) group and non DU group. Correlation of HGS and BCI was evaluated by correlation analysis. Student t test was used for comparison of HGS between DU group and non DU group. A receiver operating characteristics (ROC) curve was used to examine the diagnostic power of HGS for the detection of DU.

Results
A total of 64 men (mean age 63.1±15.2 years old) were included in the study. Among those, 36 (56.3%) patients had DU. Mean HGS and BCI were 30.3±6.9kg and 92.7±34.6, respectively. Correlation analysis showed significant positive correlation of HGS and BCI (p=0.001, R^2=0.39). DU group showed significantly lower HGS than non DU group. (29.3 vs. 32.9, p=0.04). Area under curve (AUC) of HGS for the detection of DU on ROC curve were 66.4% (95%CI = 53.1%-79.7%, p=0.026). Using cut off score of HSG ≤ 25kg, the sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) were 30.6%, 89.3%, 78.6% and 50.0%. When we used cut off score of < 35kg, the sensitivity, specificity, PPV and NPV were 83.3%, 39.3%, 63.8% and 64.7%.

Interpretation of results
Strong correlation between HGS and DU were observed. Especially, more than 75% of patients with HGS of 25 or lower had DU. If HGS of a patient were 35 or more, only of 35% of the patients had DU. Hang grip test is an useful tool for the prediction of DU.

Concluding message
HGS has a close correlation with bladder contractility. Patient who has low HGS would be likely to have DU. These findings suggest that this simple HGS test would be helpful as an ancillary data about bladder function when considering surgery or medication. Studies with larger number of patients were warranted to prove the usefulness of hand grip test for the detection of DU. Furthermore, an influence of HGS on outcomes following surgical treatment for LUTS should be examined in subsequent studies.

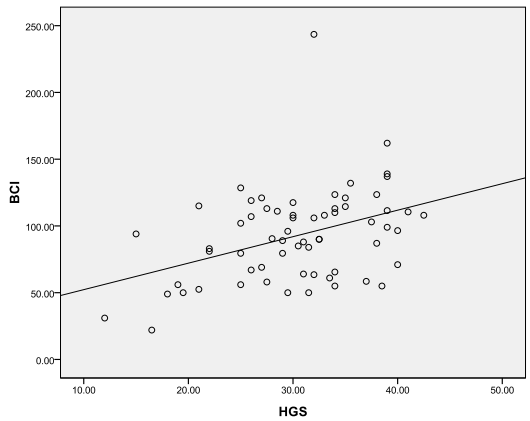

Figure: Correlation analysis of HGS and BCI (p=0.001, R^2=0.39)

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